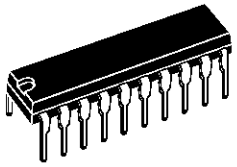
VISIT…

SGS-THOMSON MICROELECTRONICS

# TDA7250

## 60 W HI-FI DUAL AUDIO DRIVER

- WIDE SUPPLY VOLTAGE RANGE : 20 TO 90 V (± 10 to ± 45 V)
- VERY LOW DISTORTION
- AUTOMATIC QUIESCENT CURRENT CONTROL FOR THE POWER TRANSISTORS WITHOUT TEMPERATURE SENSE ELEMENTS
- OVERLOAD CURRENT PROTECTION FOR THE POWER TRANSISTORS
- MUTE/STAND-BY FUNCTIONS
- LOW POWER CONSUMPTION
- OUTPUT POWER 60 W/8 Ω AND 100 W/4 Ω

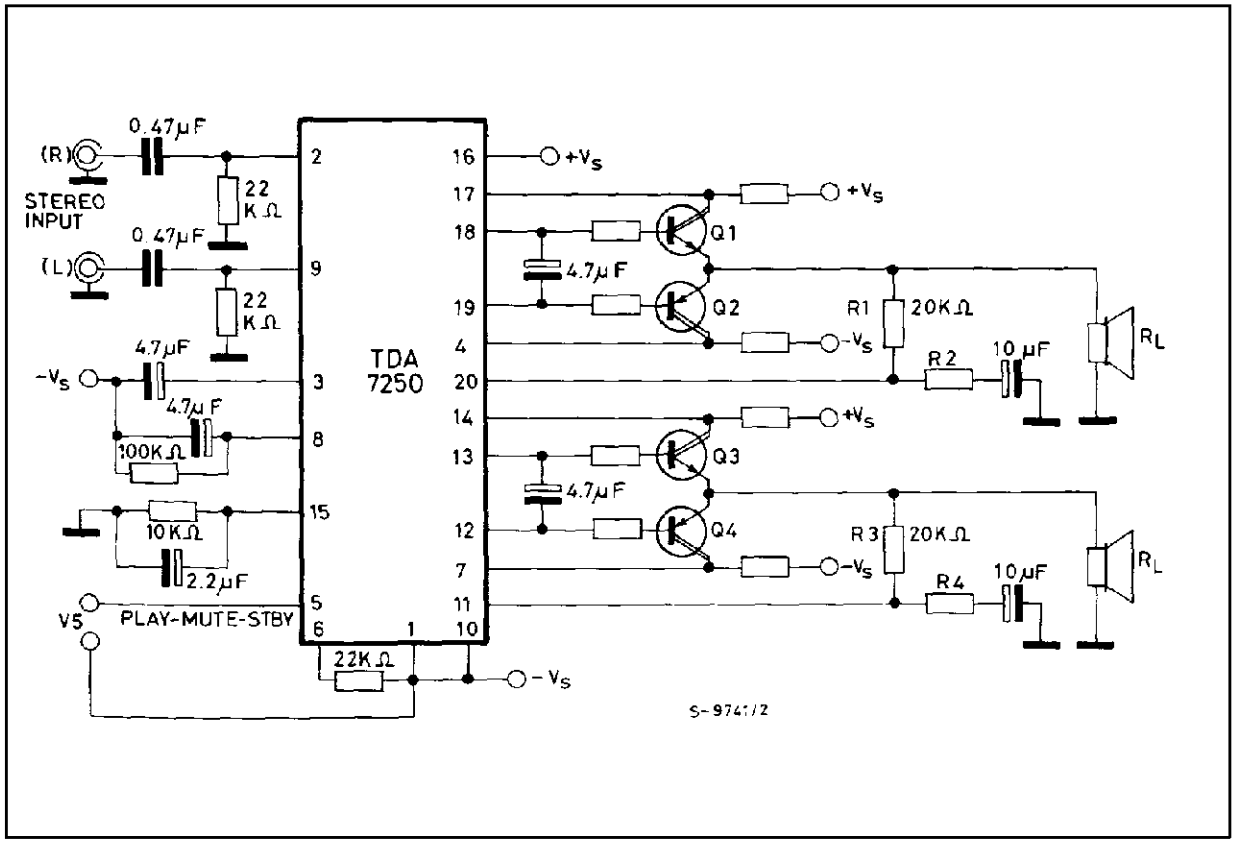


**DIP20**
**ORDERING NUMBER** : TDA7250

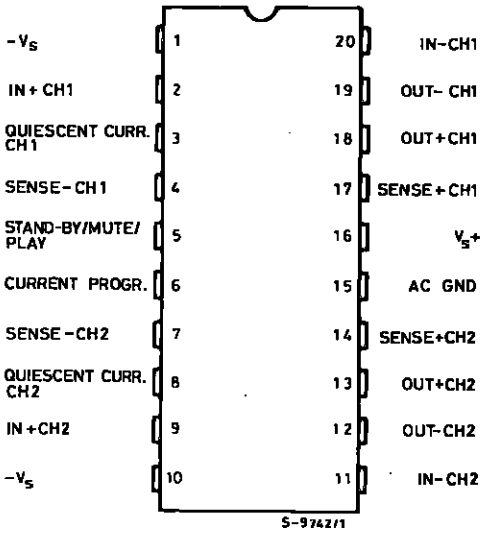
### DESCRIPTION

The TDA7250 stereo audio driver is designed to drive two pair of complementary output transistor in the Hi-Fi power amplifiers.

### APPLICATION CIRCUIT



## PIN CONNECTION (top view)




## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_S$ | Supply Voltage | 100 | V |
| $P_{tot}$ | Power Dissipation at $T_{amb}$ = 60 °C | 1.4 | W |
| $T_j$, $T_{stg}$ | Storage and Junction Temperature | – 40 to + 150 | °C |

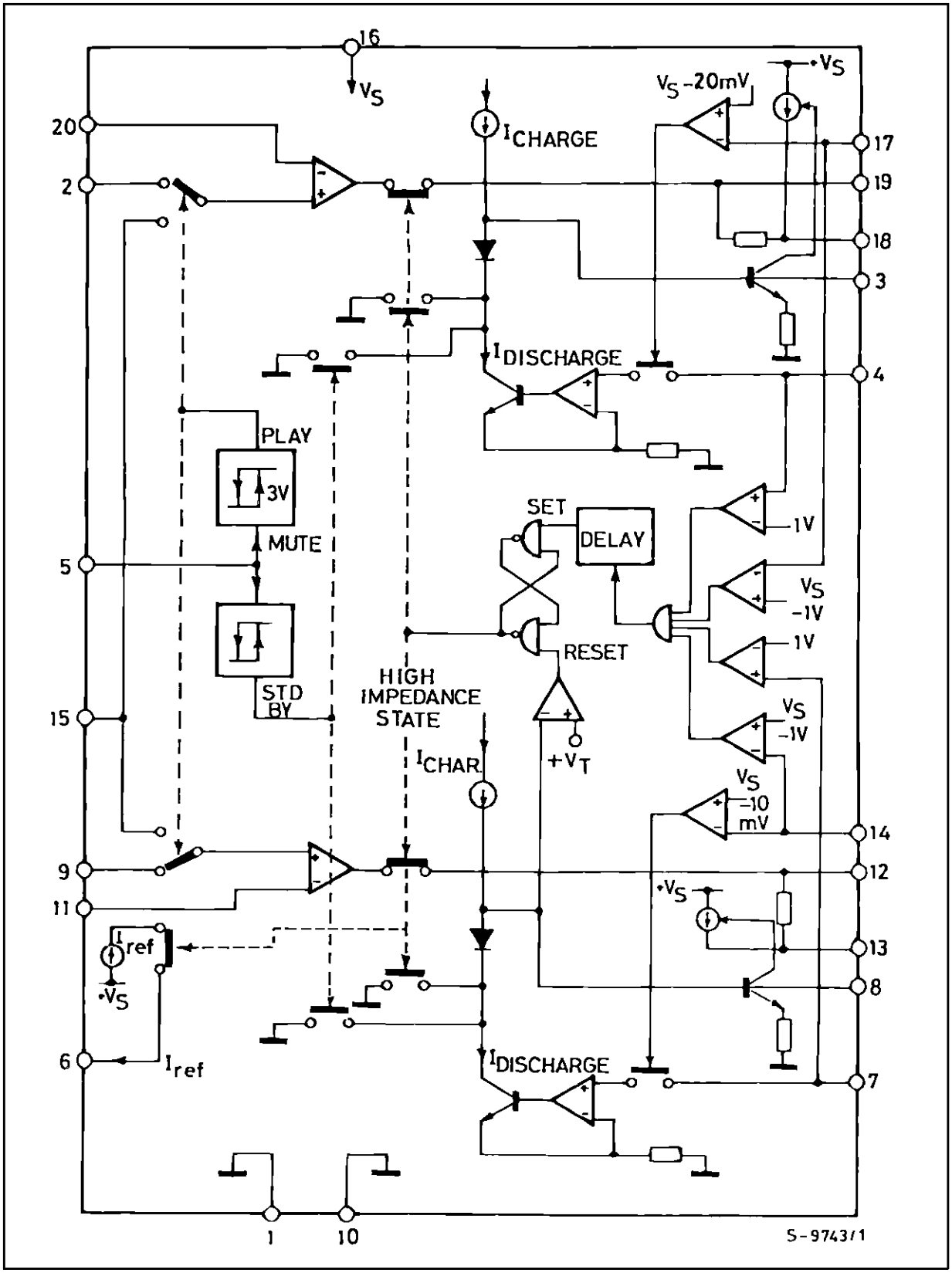
## THERMAL DATA

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $R_{th\ j\text{-}amb}$ | Thermal Resistance Junction-ambient | Max. | 65 | °C/W |

## PIN FUNCTIONS

| N° | Name | Function |
|---|---|---|
| 1 | $V_S$ – POWER SUPPLY | Negative Supply Voltage. |
| 2 | NON–INV. INP. CH. 1 | Channel 1 Input Signal. |
| 3 | QUIESC. CURRENT CONTR. CAP. CH1 | This capacitor works as an integrator, to control the quiescent current to output devices in no-signal conditions on channel 1. |
| 4 | SENSE (–) CH. 1 | Negative voltage sense input for overload protection and for automatic quiescent current control. |
| 5 | ST. BY / MUTE / PLAY | Three-functions Terminal.<br>For $V_{IN}$ = 1 to 3 V, the device is in MUTE and only quiescent current flows in the power stages ; - for $V_{IN}$ < 1 V, the device is in STAND-BY mode and no quiescent current is present in the power stages ; - for $V_{IN}$ > 3 V, the devic |
| 6 | CURRENT PROGRAM | High Impedance Power-stages Monitor. |
| 7 | SENSE (–) CH. 2 | Negative Voltage Sense Input for Overload Protection and for Automatic Quiescent Current Control. |
| 8 | QUIESC. CURRENT CONTR. CAP. CH. 2 | This capacitor works as an integrator, to control the quiescent current to output devices in no-signal conditions on channel 2. If the voltage at its terminals drops under 250 mV, it also resets the device from high-impedance state of output stages. |
| 9 | NON–INV. INP. CH. 2 | Channel 2 Input Signals. |
| 10 | $V_S$ – POWER SUPPLY | Negative Supply Voltage. |
| 11 | INVERT. INP. CH. 2 | Feedback from Output (channel 2). |
| 12 | OUT (–) CH. 2 | Out Signal to Lower Driver Transistor of Channel 2. |
| 13 | OUT (+) CH. 2 | Out Signal to Higher Driver Transistor of Channel 2. |
| 14 | SENSE (+) CH. 2 | Positive Voltage Sense Input for Overload Protection and for Automatic Quiescent Current Control. |
| 15 | COMMON AC GROUND | AC Input Ground in MUTE Condition. |
| 16 | $V_S$ + POWER SUPPLY | Positive Supply Voltage. |
| 17 | SENSE (+) CH. 1 | Positive Voltage Sense Input for Overload Protection and for Automatic Quiescent Current Control. |
| 18 | OUT (+) CH. 1 | Out Signal to High Driver Transistor of Channel 1. |
| 19 | OUT (–) CH. 1 | Out Signal to Low Driver Transistor of Channel 1. |
| 20 | INVERT. INP. CH. 1 | Feedback from Output (channel 1). |

## BLOCK DIAGRAM



**ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, $V_S$ = ± 35 V, play mode, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_S$ | Supply Voltage | | ± 10 | | ± 45 | V |
| $I_d$ | Quiescent Drain Current | Stand-by Mode | | 8 | | mA |
| | | Play Mode | | 10 | 14 | |
| $I_b$ | Input Bias Current | | | 0.2 | 1 | µA |
| $V_{os}$ | Input Offset Voltage | | | 1 | ± 10 | mV |
| $I_{os}$ | Input Offset Current | | | 100 | 200 | nA |
| $G_v$ | Open Loop Voltage Gain | f = 100 Hz | | 90 | | dB |
| | | f = 10 kHz | | 60 | | |
| $e_N$ | Input Noise Voltage | $R_G$ = 600 Ω<br>B = 20 Hz to 20 kHz | | 3 | | µV |
| SR | Slew Rate | | | 10 | | V/µs |
| d | Total Harmonic Distortion | $G_v$ = 26 dB, $P_o$ = 40 W<br>f = 1 kHz<br>f = 20 kHz | | <br>0.004<br>0.03 | | <br>%<br>% |
| $V_{opp}$ | Output Voltage Swing | | | 60 | | $V_{pp}$ |
| $P_o$ | Output Power (*) | $V_S$ = ± 35 V, $R_L$ = 8 Ω<br>$V_S$ = ± 30 V, $R_L$ = 8 Ω<br>$V_S$ = ± 35 V, $R_L$ = 4 Ω | | 60<br>40<br>100 | | W<br>W<br>W |
| $I_o$ | Output Current | | | ± 5 | | mA |
| SVR | Supply Voltage Rejection | f = 100 Hz | | 75 | | dB |
| $C_s$ | Channel Separation | f = 1 kHz | | 75 | | dB |

**MUTE / STANDBY/ PLAY FUNCTIONS**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_i$ | Input Current (pin 5) | | | 0.1 | | µA |
| $V_{th}$ | Comparator Standby / Mute Threshold (**) | | 1.0 | 1.25 | 1.5 | V |
| H | Hysteresis Standby / Mute | | | 200 | | mV |
| $V_{th}$ | Comparator Mute / Play Threshold (**) | | 2.4 | 3.0 | 3.6 | V |
| H | Hysteresis Mute / Play | | | 300 | | mV |
| | Mute Attenuation | f = 1 kHz | | 60 | | dB |
| $V_i$ | Input Voltage Max. (pin 5) | | 12 (**) | | | V |

(*) Application circuit of fig. 1 f = 1 KHz ; d = 0.1 % ; $G_v$ =26 dB.
(**) Referred to – $V_s$.

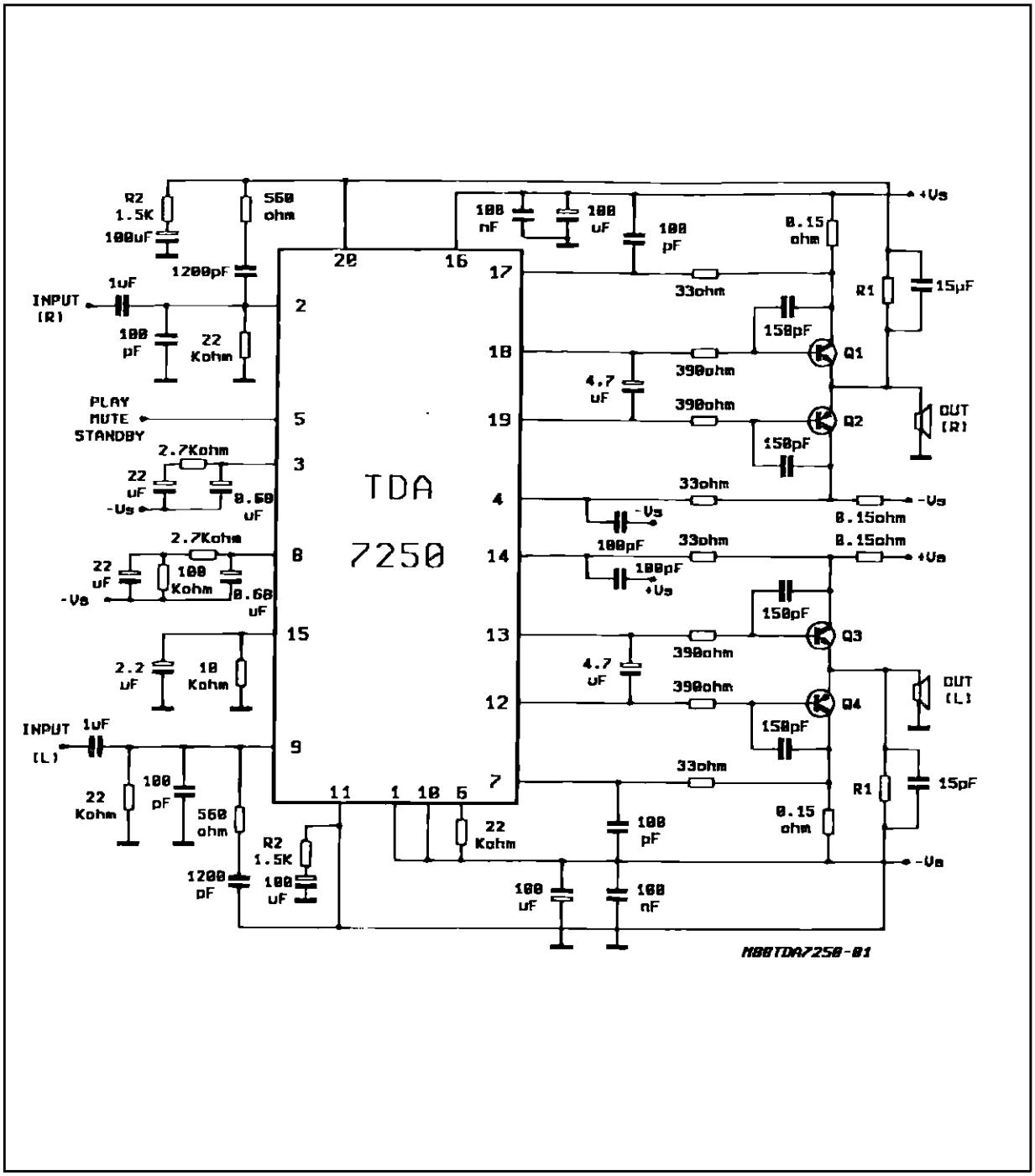
**CURRENT SURVEY CIRCUITRY**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| | Comparator Reference | to + $V_S$<br>to – $V_S$ | 0.8<br>0.8 | 1<br>1 | 1.4<br>1.4 | V<br>V |
| $t_d$ | Delay Time | | 10 | | | µs |

**QUIESCENT CURRENT CONTROL**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| | Capacitor Current | Charge<br>Discharge | 30<br>250 | 60<br>500 | | µA<br>µA |
| | Comparator Reference | to + $V_S$<br>to – $V_S$ | 10 | 20<br>10 | 25 | mV<br>mV |

**Figure 1** : Application Circuit with Power Darlingtons.




**Note :** Q1/Q2 = Q3/Q4 = TIP 142/TIP147
GV = 1 + R1/R2

**Figure 2 :** Output Power vs. Supply Voltage.

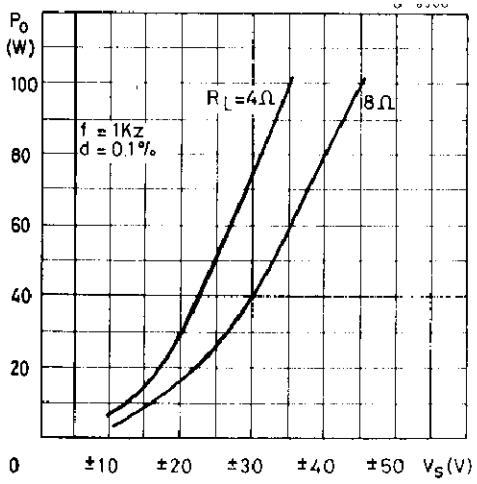



**Figure 3 :** Distortion vs.Output Power (*).

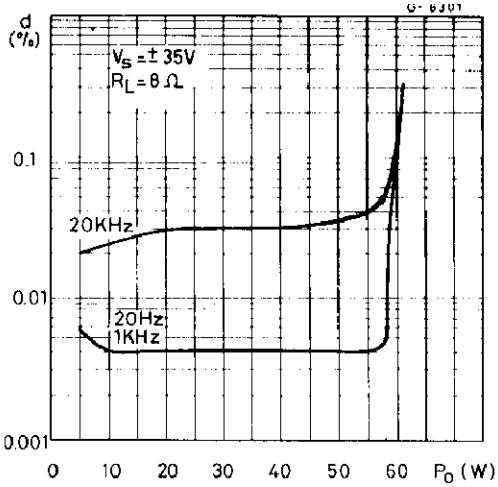



**Figure 4 :** Channel Separation.

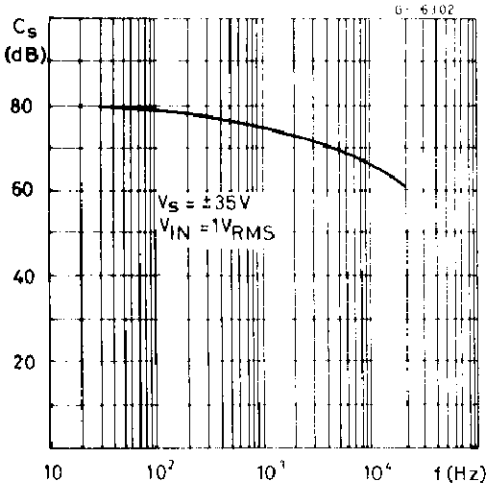



**Figure 5 :** Supply Voltage Rejection vs. Frequency.

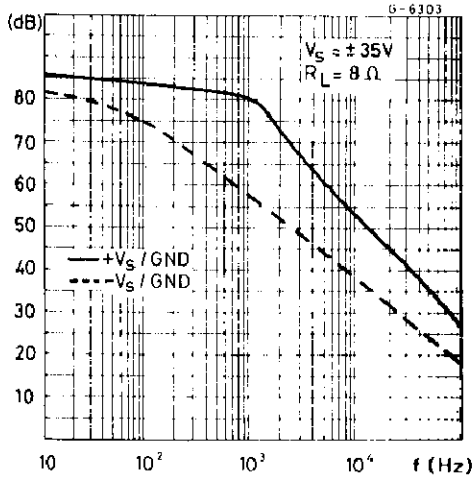



**Figure 6 :** Quiescent Current vs. Supply Voltage.

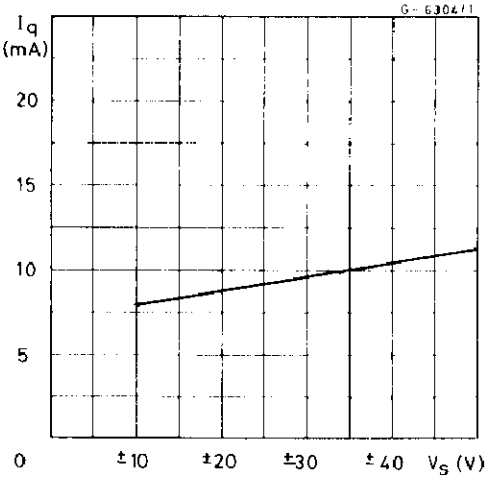



**Figure 7 :** Quiescent Current vs. $T_{amb}$.

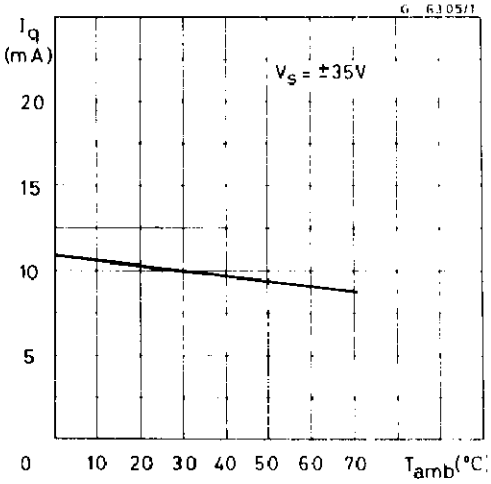


**Figure 8 :** Total Dissipated Power vs. Output Powe r (*).

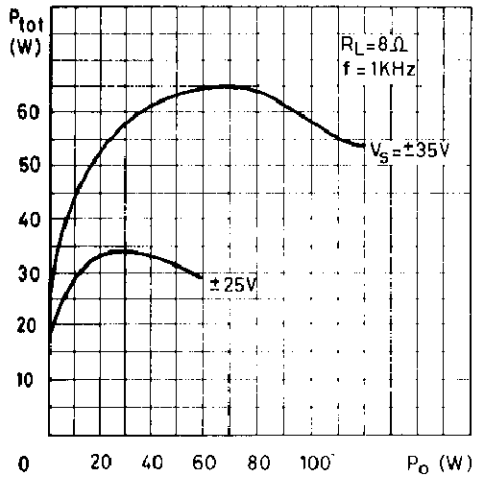



**Figure 9 :** Efficiency vs. Output Power (*).

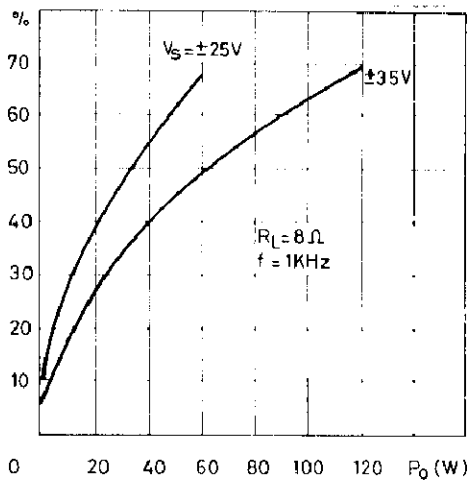
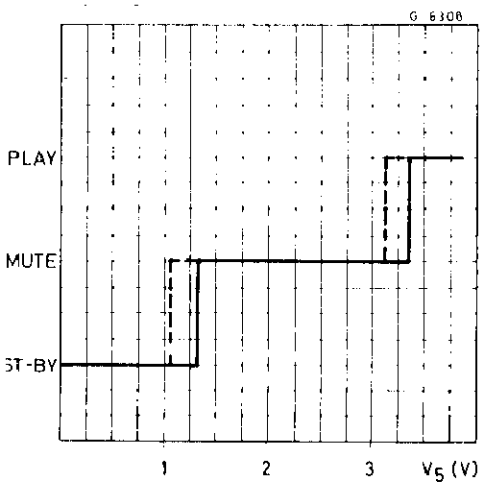



**Figure 10 :** Play-mute Standby Operation.




(*) Complete circuit

**Figure 11 :** Application Circuit Using Power Transistors.

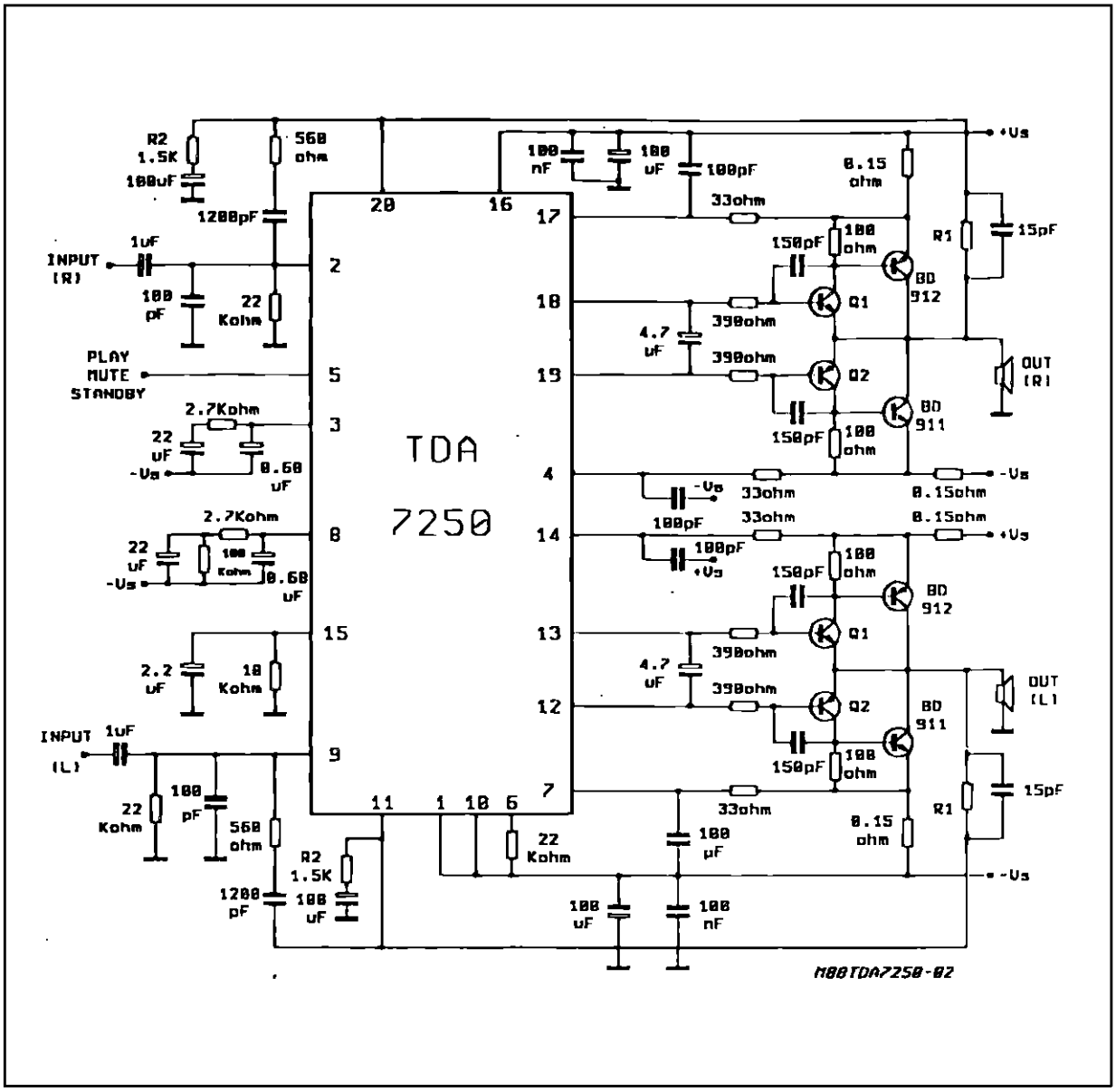



**Figure 12 :** Suggested Transistor Types for Various Loads and Powers.

$R_L = 8\ \Omega$

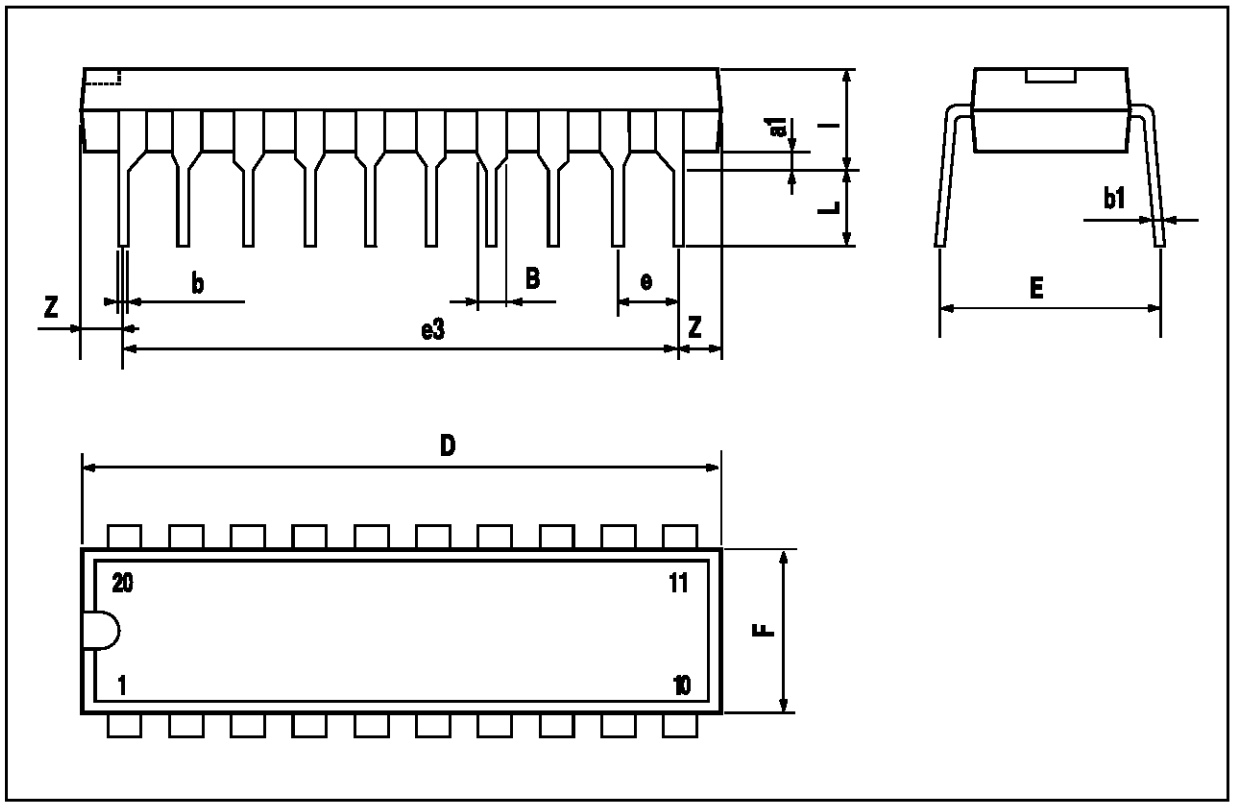
| 15W | +30W | +50W | +70W |
|---|---|---|---|
| BDX 53/54A | BDX 53/54B | BDW 93/94B | TIP 142/147 |

$T_L = 4\ \Omega$

| 30W | +50W | +90W | +130W |
|---|---|---|---|
| BDW 93/94A | BDW 93/94B | BDV 64/65B | MJ 11013/11014 |

## DIP20 PACKAGE MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| a1 | 0.51 | | | 0.020 | | |
| B | 0.85 | | 1.40 | 0.033 | | 0.055 |
| b | | 0.50 | | | 0.020 | |
| b1 | 0.38 | | 0.50 | 0.015 | | 0.020 |
| D | | | 24.80 | | | 0.976 |
| E | | 8.80 | | | 0.346 | |
| e | | 2.54 | | | 0.100 | |
| e3 | | 22.86 | | | 0.900 | |
| F | | | 7.10 | | | 0.280 |
| I | | | 5.10 | | | 0.201 |
| L | | 3.30 | | | 0.130 | |
| Z | | | 1.27 | | | 0.050 |



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